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INFORMATION EQUIPMENT
[Joho Kiki]

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Claims

1. An information equipment, characterized by the fact that in an information equipment that transmits data to a printer by a radio communication and makes the printer print the data transmitted, it is equipped with a measurement means for measuring the reception sensitivity of the above-mentioned radio communication; and a means for displaying the reception sensitivity measured by said measurement means.

2. The information equipment of Claim 1, characterized by being further equipped with a detection means for detecting the degradation of the reception sensitivity measured by the above-mentioned measurement means; and a means for reporting said degradation by a voice when the above-mentioned detection means detects the degradation of the reception sensitivity.

3. The information equipment of Claim 1 or 2, characterized by being further equipped with a means for calculating the time required for transmitting the data to

[1] Numbers in the margin indicate pagination in the foreign text.

the above-mentioned printer header; and a means for displaying the required time displayed by said means.

4. The information equipment of Claim 3, characterized by being further equipped with a calculation means for calculating the remaining required time during the data transmission to the above-mentioned printer; and a means for displaying the remaining required time calculated by said calculation means.

5. The information equipment of Claim 4, characterized by being further equipped with a means for reporting the completion of the transmission of the above-mentioned data by a voice when the remaining required time calculated by the above-mentioned calculation means is 0.

6. The information equipment of any of Claims 1-5, characterized by being further equipped with a means for receiving information on a printing wait from the above-mentioned printer; and a means for displaying the information received by said means.

Detailed explanation of the invention

[0001]

(Technical field of the invention)

The present invention pertains to an improvement of an information equipment that transmits data to a printer by a

radio communication and makes the printer print the data transmitted.

[0002]

(Prior art)

Also, along the supply of recent personal computers, the supply of its peripheral equipments have been remarkable, and printers have been supplied to individual users as well as enterprises. Since the personal computer and the printer adopt a shape in which they are connected by parallel cable, etc., it is difficult to move the persona computer in an ordinary state in which the personal computer and the printer are connected. However, notebook type personal computers have recently been supplied. Since users who moved the places where the personal computers were used had to reconnect the personal computers and the printers for each printing and the connection/disconnection was repeated, the degradation of the parallel cable and its connector was advanced, and the way of usage was not good for the users.

[0003] The above-mentioned problems are solved by radio-connecting the personal computer and the printer. In Japanese Kokai Patent Application No. Hei 9[1997]-93672, “printing control device and method,” which inquires a printer of an information equipment at a fixed interval,

when the information equipment such as personal computer and the printer are in a communicable state by radio, and always displays the state of the printer on the screen of the information equipment, so that a user detects the current printer state, is presented. Thus, when printing is carried out, the completion of the printing processing can be detected, and since the state of the printer can be recognized at the stage prior to the printing, the useless printing operation in an impossible printing state can be removed.

[0004]

(Problems to be solved by the invention)

In the above-mentioned "printing control device and method," it is assumed that the printer and the information equipment can be communicated by radio, and the state of the printer can be recognized. For example, in case a portable information equipment (mobile equipment) such as notebook type personal computer is assumed as the information equipment, since there is a possibility that a printing error is generated, though the printing possibility/impossibility can be decided by the information equipment, printing data cannot be moved to the information equipment during the transmission, and the usage advantage of the radio communication cannot be sufficiently utilized.

[0005] In other words, in case data are transmitted to a printer whose installation position is fixed from an information equipment such as desktop type personal computer whose installation position is fixed, since they are respectively installed in consideration of a communicable distance by radio, there is a problem in the communicable distance. However, in case a radio communication is carried out using a portable information equipment, if a transmitter moves freely during the transmission of data, the portable information equipment is out of the communicable distance, so that there is a possibility that a communication error is generated. The present invention considers the above-mentioned information, and its purpose is to provide an information equipment that transmits data to a printer by a radio communication, makes the printer print the data transmitted, and can suppress the generation of a transmission error during the transmission of the data.

[0006]

(Means to solve the problems)

The information equipment of the present invention is characterized by the fact that in the information equipment that transmits data to a printer by a radio communication and makes the printer print the data transmitted, it is

equipped with a measurement means for measuring the reception sensitivity of the above-mentioned radio communication; and a means for displaying the reception sensitivity measured by said measurement means.

[0007] In this information equipment, data are transmitted to the printer by a radio communication, and the data transmitted are printed by the printer. The measurement means measures the reception sensitivity in the radio communication, and the display means displays the reception sensitivity measured by the measurement means. Thus, since the information equipment displays the reception sensitivity of the radio communication, the reception sensitivity of the radio communication is in a good state, and the information equipment can be moved. Thus, since printing in a state in which the sensitivity of the radio communication is poor can be avoided, the generation of a transmission error of the printing data can be suppressed.

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[0008] Also, the information equipment of the present invention is characterized by being further equipped with a detection means for detecting the degradation of the reception sensitivity measured by the above-mentioned measurement means; and a means for reporting said

degradation by a voice when the above-mentioned detection means detects the degradation of the reception sensitivity.

[0009] In this information equipment, the detection means detects the degradation of the reception sensitivity measured by the measurement means, and when the detection means detects the degradation of the reception sensitivity during the transmission of data, the report means reports the degradation by a voice. Thus, a user can immediately recognize the state being a transmission error and can suppress the generation of the transmission error.

[0010] Also, the information equipment of the present invention is characterized by being further equipped with a means for calculating the time required for transmitting the data to the above-mentioned printer header; and a means for displaying the required time displayed by said means.

[0011] In this information equipment, the calculation means calculates the time required for transmitting data to the printer, and the display means displays the required time calculated. Thus, a user can recognize the required time for transmitting the printing data prior to the operation for printing, confirms the required time after the printing operation, can move the information equipment, and can suppress the generation of an unexpected transmission error.

[0012] Also, the information equipment of the present invention is characterized by being further equipped with a calculation means for calculating the remaining required time during the data transmission to the above-mentioned printer; and a means for displaying the remaining required time calculated by said calculation means.

[0013] In this equipment, the calculation means calculates the remaining required time during the data transmission to the printer, and the display means displays the remaining required time calculated by the calculation means. Thus, a user can recognize the transmission state of the printing data, can rapidly recognize an inconvenience generated during the transmission of the printing data, and can lighten the psychological stress of the user due to the wait of the transmission completion of the printing data.

[0014] Also, the information equipment of the present invention is characterized by being further equipped with a means for reporting the completion of the transmission of the above-mentioned data by a voice when the remaining required time calculated by the above-mentioned calculation means is 0.

[0015] In this information equipment, when the remaining required time calculated by the calculation means is 0, since the report means reports the completion of the

transmission of printing data by a voice. Thus, a user can recognize the transmission completion of the printing data, can detect the transmission completion of the printing data while carrying out other works after the printing operation, and can detect that information equipment may be moved.

[0016] Also, the information equipment of the present invention is characterized by being further equipped with a means for receiving information on a printing wait from the above-mentioned printer; and a means for displaying the information received by said means.

[0017] In this information equipment, the reception means receives information on the printing wait from the printer, and the display means displays the information received by the reception means. Thus, after the printing operation, it can be anticipated that the printing output is delayed.

[0018]

(Embodiment of the invention)

Next, the present invention is explained based on the figures showing its embodiment. In this embodiment, since Bluetooth is used as a means for connecting a printer and an information equipment by a radio communication, the communication standards of the Bluetooth are explained below. The frequency band being used in the Bluetooth is

2.4 GHz band being allocated for an intermediate-speed radio LAN (Local Area Network) in Japan. This frequency band is internationally used as an ISM (Industrial Scientific Medical) band (industrial scientific medical band: 2,400-2,483.5 MHz) of electronic ovens and medical equipments, and the Bluetooth is also joined as a radio equipment with a small power that does not require a radio license.

[0019] Therefore, this frequency band is a frequency environment that is disordered and has much interferences and noises, and in case the ISM band is used, a spread spectrum method should be employed in Japan and Europe. In the Bluetooth, a frequency hopping/spread spectrum method (SSFH: Spread Spectrum Frequency Hopping) is employed. The spread spectrum frequency hopping method is a method that changes the frequency of carrier waves at each fixed time (frequency hopping) and carries out a transmission. The interference with other system communications is difficult, and the interference from other system communications is also difficult be received.

[0020] The carrier wave frequency of the Bluetooth is the ISM band as mentioned above, and 247-2,497 MHz of the frequency is used in Japan. Its modulation method is a two-valued frequency shift keying method (0.5 BT Gaussian

filter SFSK1M symbol/sec, a modulation index of 0.28-0.35). The frequency hopping is 1,600 hops/sec (an interval of 1 MHz) in an ordinary operation, and there are five kinds of different hopping sequences.

[0021] Bluetooth channels respectively have a band of 1 MHz, and the frequency hopping is carried out over 79 channels (23 channels in Japan). Since the modulation method is 2FSK, carrier waves are shifted between two frequencies showing “1” and “0.” In this modulation method, there is no large meaning in the amplitude and the phase. Its transmission power is 1-100 mW in class 1, 0.25-2.5 mW in class 2, and 1 mW in class 3. Its data transmission rate is 721 kbits/sec (57.6 kbits/sec in the return direction) at maximum of an asymmetric link and

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432.6 kbit/sec of a symmetric link (the reason why the data transmission rate is lower than 1 M symbol/sec is that there is an overhead unique to the protocol) in an asynchronous channel.

[0022] Its link control unit (link controller) is in charge of probability of a network connection, power save, error correction (FEC; Forward Error Correction), recognition, and encryption. A Bluetooth radio equipment is operated as any of a master unit and a slave unit. The connection

between the master unit and the slave unit is established by a link manager. The master unit can simultaneously carry out communications with seven slave units at maximum and can also register 200 slave units or more. Its control area is defined as ”piconet.”

[0023] The master unit of a certain piconet can be operated as a slave unit for the master unit of another piconet. The network of the piconet is called “squitter net.” The slave units of these piconet and squitter net are at a standby mode in many cases, and the power consumption is reduced.

[0024] The frequency band of the Bluetooth is divided into time slots (TDD; Time Division Duplexing), and each slot corresponds to one RF hop frequency. The master unit carries out a transmission by even time slots, and the slave unit carries out a transmission by odd time slots. A bit string of data (including voices and images) in the piconet is transmitted by packets. As the packet length, there are 1 time slot, 3 time slot, and 5 time slot. One packet consists of access code, header, and payload.

[0025] Figure 1 is an illustrative diagram for explaining a constitutional example of the system related to an image forming device in which the above-mentioned Bluetooth is used in a radio communication. This system is constituted

by connecting various terminals (information equipments) such as portable terminals 31 and 32, desktop type terminal 33, notebook type terminal 34, and portable phone 35 on a network NW such as LAN by wire or radio. Bluetooth units 41 and 42 are connected to the portable terminals 31 and 32, Bluetooth unit 43 is connected to desktop type terminal 33, and Bluetooth unit 44 is connected to the notebook type terminal 34 so that each of them can be attached and detached or fixed. A Bluetooth unit is built in advance in the portable phone 35.

[0026] Various printing devices 11, 12, 13, and 14 (printers) are connected onto the network NW by wire or radio, and Bluetooth units 21, 22, 23, and 24 are connected to the printing devices 11, 12, 13, and 14 so that they can be attached and detached or fixed. In each Bluetooth unit 41, 42, 43, and 44 and the portable phone 35 (Bluetooth units 21, 22, 23, and 24 are also similar), the transmission frequencies are made different as shown in Figure 2 so that they are not interfered with other Bluetooth units. In the reception parts of each Bluetooth unit 41, 42, 43, and 44 and the portable phone 35, the existence of receptions at each frequency as shown in Figure 2 is recognized by a time division processing.

Then, a transmission destination is specified by the recognized frequency.

[0027] Figure 3 is a block diagram showing a constitutional example of the Bluetooth unit. The Bluetooth unit largely consists of base band part 300, RF part transmitter 201, and RF part receiver 202, and the base band part 200 consists of microprocessor 103 being operated by a clock signal from a clock 102, DSP (Digital Signal Processor) base band processor 101, I/O port 106, and ROM 104 and flash ROM being used in the microprocessor 103.

[0028] The I/O port 106 exchanges signals with the CPU 100 to which the Bluetooth unit is connected so that it can be attached and detached or fixed and in which a printing device 1 is built, for instance. The DSP base band processor 101 is controlled from the microprocessor 103, and a digital base band signal containing transmission data is given to the RF part transmitter 201. In the RF part transmitter 201, a D/A converter 110 converts the given base band signal into an analog signal. The analog signal is filtered by a low-pass filter 111 and FM-modulated by a FM modulator 112. The FM modulator 112 carries out the FM modulation by carrier waves output from an oscillator 205 that receives a frequency hopping control from the DSP base band processor 101. The oscillator 205 is built in the RF

part receiver 202 and connected to the FM modulator 112 at a time of transmission and a mixer 207 at a time of reception, respectively by a switch 206.

[0029] The signal FM-modulated by the FM modulator 112 is further burst-modulated by a burst modulator 113, passed through a switch 204, filtered in a RF filter 131, and transmitted from an antenna 203. The switch 204 connects the RF filter 131 and the antenna 203 to the RF part transmitter 201 at a time of transmission and the RF part receiver 202 at a time of reception, respectively by a switch driver 130.

[0030] The signal received from the antenna 203 is filtered in the RF filter 131, passed through the switch 204, and given to the RF part receiver 202. The received signal given to the RF part receiver 202 is amplified and filtered in the band filter 208. The received signal filtered in the band filter 208 is mixed with a local oscillating frequency signal output from the oscillator 205, which has received a frequency hopping control from the DSP base band processor 101, by the mixer 207, converted into an

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intermediate-frequency signal, and demodulated by a FM demodulator 121. The signal demodulated by the FM demodulator 121 is converted into a digital signal by a

threshold detector/clock recovery 120 and given to the DSP base band processor 101. The digital signal given to the DSP base band processor 101 is given to the CPU 100 of the printing device 1 in accordance with the contents.

[0031] Figure 4 shows an embodiment of the information equipment of the present invention and is a block diagram showing each main part constitution common to the terminal equipments of the portable terminals 31, 32, desktop type terminal 33, notebook type terminal 34, and portable phone 35 in Figure 1. In this terminal equipment, a CPU 56 is connected to ROM 57, RAM 58, display part 61 including a liquid crystal display and its control circuit, operation part 62, Bluetooth unit 54 as shown in Figure 3, and speaker control part 59 for driving and controlling a speaker 60 by a bus 50. A calculation part 57a and a count part 57b are built in the ROM 57 (here, regardless of rewritable/non-rewritable). A transmission and reception image memory 58a is built in the RAM 58 (here, regardless of volatile/nonvolatile), and various kinds of data files are also stored.

[0032] Next, the operation of the terminal equipment with this constitution is explained referring to the flow chart of Figure 5. If a printing request operation is carried out in the operation part 62, the terminal equipment calls

a list (data) of files to be printed in the RAM 58 and displays it on the display part 61, like the screen shown in Figure 6(a) (S2). If a selection operation from the list of the files displayed (S2) is carried out in the operation part 62 (S4), the terminal equipment displays the contents of the file (data) selected on the display 61, like the screen shown in Figure 6(b) (S6). Its contents are attributes of the file, and for example, they are name, kind, and size of the file.

[0033] Next, the terminal equipment obtains the situation of the printing device registered in the terminal equipment and displays it on the display part 61, like the screen show in Figure 6(c) (S8). The situation of the printing device is given to the Bluetooth units (41, 42, 43, 44, 35 (Figure 1)) connected to the terminal equipment from the Bluetooth units (21, 22, 23, 34 (Figure 1)) connected to the printing device. For example, it is a printing device information, and there are color/monochromic printing kind, page/line printing method, name of machine, possibility of radio communication, number of printing wait job (printing wait), etc. The number of printing wait job is the number of printing request that has already been received by the printing device (Claim 6).

[0034] If the selection operation from the printing device displayed (S8) on the display part 61 is carried out in the operation part 62 (S10), the terminal equipment starts the transmission of the printing data (S12). At that time, the terminal equipment calculates the required time of the transmission from the size of the printing data and the transmission speed of the Bluetooth units, measures the reception sensitivity of the radio communication of the Bluetooth units (S13), displays a word of "the data will be transmitted," like the screen shown in Figure 6(d), and displays the measured reception sensitivity of the radio communication on the display part 61 (S14) (Claims 1 and 3).

[0035] In the measurement means of the reception sensitivity of the radio communication, for example, as described in Japanese Kokai Patent Application No. Hei 5[1993]-75553, data signals being carried by a specific pattern are transmitted in advance to the other transmission party destination, the degree that the pattern is precisely received is periodically detected during the image data transmission, and the reception sensitivity is measured based on the detection result.

[0036] The terminal equipment calculates the remaining required transmission time by counting the amount of

printing data being transmitted by the count part 57b during the transmission of the image data and displays a word of “data transmission in progress,” the remaining required transmission time calculated, and the reception sensitivity of the radio communication of the Bluetooth units on the display part 61, like the screen shown in Figure 6(e) (S15) (Claim 2).

[0037] The terminal equipment displays the reception sensitivity of the radio communication, like the screen shown in Figure 6(e), even during the transmission of the printing data and updates the display at any time, so that a user can move the terminal equipment in the range where the sensitivity is good, even during the printing data transmission. However, the user must always see the display of the reception sensitivity, causing an inconvenience. Accordingly, in case the reception sensitivity of the radio communication is degraded, the degradation is reported from the speaker 60 by a voice (Claim 5).

Thus, in case the terminal equipment is a portable equipment, the portability can be improved.

[0038] If the remaining required transmission time calculated in the count part 57b is 0 and the transmission of the printing data is finished (S16), the terminal

equipment displays a word of “the data transmission has been finished,” like the screen shown in Figure 6(f), on the display part 61 and reports the completion of the data transmission by a voice from the speaker 60 (S18) (Claim 4).

Thus, the user can detect the completion of the data transmission without seeing the display part 61. Also, in each voice from the above-mentioned speaker 60, the sound for reporting the transmission completion of the printing data and the sound for reporting the reception sensitivity degradation of the radio communication are preferably made different. Also, they may be reported by words with human voices.

[0039]

(Effects of the invention)

According to the information equipment of the present invention, since the information equipment displays the reception sensitivity of the radio communication, the reception sensitivity of the radio communication is in a good state, and the information equipment can be moved.

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Thus,, since printing in a state in which the sensitivity of the radio communication is poor can be avoided, the

generation of a transmission error of the printing data can be suppressed.

[0040] Also, according to the information equipment of the present invention, a user can immediately recognize the state being a transmission error and can suppress the generation of the transmission error.

[0041] Also, according to the information equipment of the present invention, a user can recognize the required time for transmitting the printing data prior to the operation for printing, confirms the required time after the printing operation, can move the information equipment, and can suppress the generation of an unexpected transmission error.

[0042] Also, according to the information equipment of the present invention, a user can recognize the transmission state of the printing data, can rapidly recognize an inconvenience generated during the transmission of the printing data, and can lighten the psychological stress of the user due to the wait of the transmission completion of the printing data.

[0043] Also, according to the information equipment of the present invention, a user can recognize the transmission completion of the printing data, can detect the transmission completion of the printing data while carrying

out other works after the printing operation, and can detect that information equipment may be moved.

[0044] Also, according to the information equipment of the present invention, after the printing operation, it can be anticipated that the printing output is delayed.

4. Brief description of the figures

Figure 1 is an illustrative diagram for explaining a constitutional example of the system related to an image information device in which Bluetooth is employed in a radio transmission.

Figure 2 is an illustrative diagram for explaining the transmission frequency of Bluetooth units.

Figure 3 is a block diagram showing a constitutional example of the Bluetooth units.

Figure 4 is a block diagram showing the main part constitution of a terminal equipment as an embodiment of the information equipment of the present invention.

Figure 5 is a flow chart showing the operation of the terminal equipment shown in Figure 4.

Figure 6 is an illustrative diagram for explaining an example of the screen in the operation of the terminal equipment shown in Figure 4.

Explanation of symbols:

11, 12, 13, 14 Printing devices (printers)

21, 22, 23, 24, 41, 42, 43, 44, 54 Bluetooth units

31, 32 Portable terminal (information equipment)

33 Desktop type terminal (information equipment)

34 Notebook type terminal (information equipment)

35 Portable phone (information equipment)

56 CPU

57 ROM

57a Calculation part

57b Count part

58 RAM

58a Transmission and reception image memory

60 Speaker

61 Display part

62 Operation part

NW Network

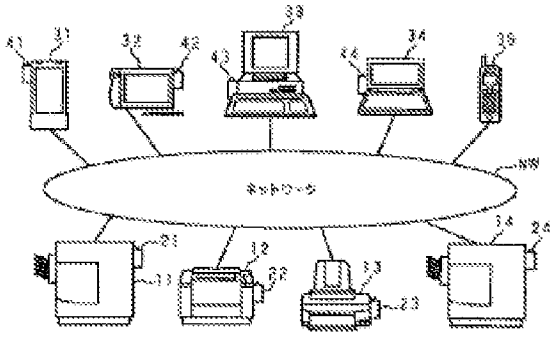

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Figure 1:

NW Network

【図２】

ブルートゥースユニット４１	Ｘ１
〃　４２	Ｘ２
〃　４３	Ｘ３
〃　４４	Ｘ４
〃　１３５	Ｘ５

Figure 2:

1. Terminal equipment

2. Transmission frequency

3. Bluetooth unit

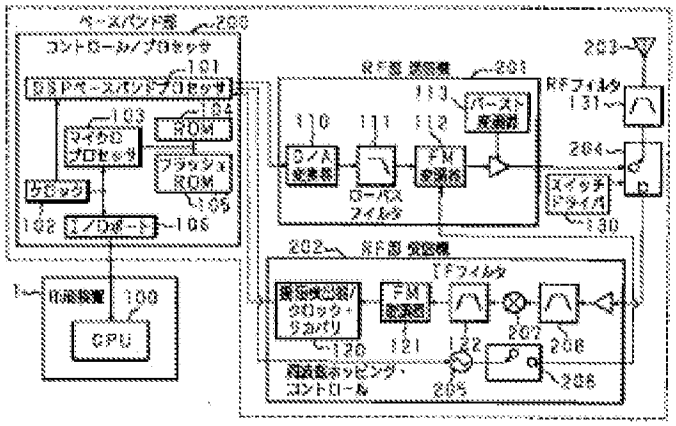

Figure 3:

1 Printing device

101 DSP base band processor

102 Clock

103 Microprocessor

105 Flash ROM

106 I/O port

110 D/A converter

111 Low-pass filter

112 FM modulator

113 Burst modulator

120 Threshold detector/clock recovery

121 FM demodulator

122 IF filter

130 Switch driver

131 RF filter

200 Base band part

201 RF part transmitter

202 RF part receiver

A. Frequency hopping control

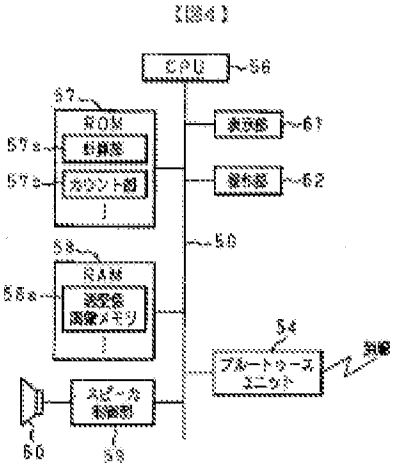

Figure 4:

54 Bluetooth unit

57a Calculation part

57b Count part

58a Transmission and reception image memory

59 Speaker control part

61 Display part

62 Operation part

A. Radio

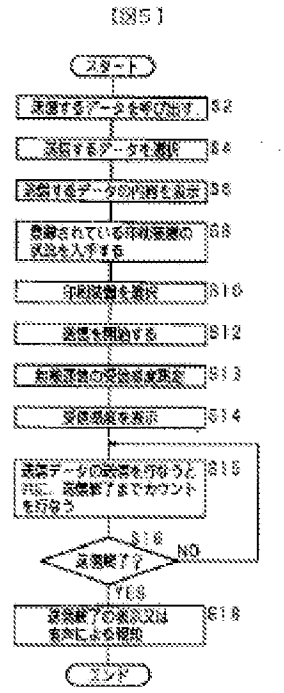

Figure 5:

1. Start

2. End

S2 Call of data to be transmitted

S4 Selection of the data to be transmitted

S6 Display of the contents of the data to be transmitted

S8 Acquisition of the situation of registered printing device

S10 Selection of printing device

S12 Start of transmission

S13 Measurement of the reception sensitivity of radio communication

S14 Display of reception sensitivity

S15 Transmission of transmission data and count until the transmission completion

S16 Transmission completion?

S18 Display of transmission completion or report with voices

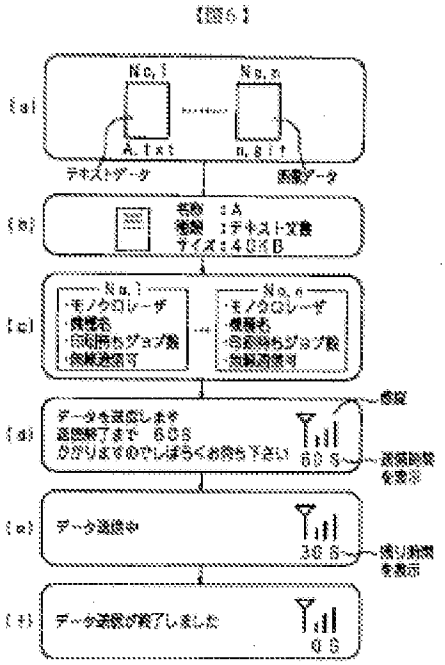

Figure 6:

1. Text data

2. Image data

3. Name: A

   Kind: Text document

   Size: 40 KB

4. Monochromic laser

   Name of machine

Number of printing wait job

Radio communication possibility

5. Monochromic laser

Name of machine

Number of printing wait job

Radio communication possibility

6. The data will be transmitted.

Since 60S is required until the transmission completion, please wait for a while.

7. Sensitivity

8. Display of transmission time

9. Data transmission in progress

10. Display of remaining time

11. The data transmission has been finished.